2016 年中国运筹学会数学规划分会研究生论坛通知

2016 中国运筹学会数学规划分会研究生论坛是由中国运筹学会数学规划分会主办，中国科学院数学与系统科学研究院承办，面向全国从事优化理论与应用研究的研究生的高水平论坛。

论坛于 2016 年 8 月 27 日至 28 日在中国科学院数学与系统科学研究院南楼 204 报告厅进行，届时会有专家特邀报告，研究生学术报告，开放式交流等多种活动，旨在为优化社区的年轻学者创造一个良好的交流机会，促进互相了解，共同提高学术水平。

此次参会人员包括中国科学院，北京大学等的知名教授，以及来自于北京大学，上海交通大学，中国科学技术大学，北京航空航天大学等的优秀研究生。会议以研究生学术报告为主，也将邀请中国科学院大学的郭田德教授、中国科学院数学与系统科学研究院戴彧虹研究员和许志强研究员做特邀报告。

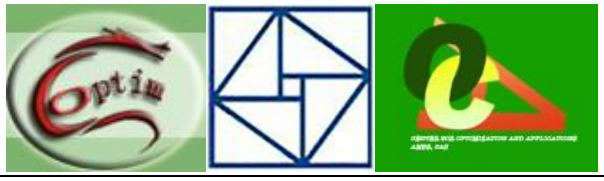
如有问题，请联系刘颖老师。

Email: liuying@lsec.cc.ac.cn 电话：010-82541740

相关链接：

中国运筹学会数学规划分会：http://www.optimization.org.cn/

中科院数学与系统科学研究院：http://www.amss.ac.cn/



会议日程

8 月 26 日星期五

3:00 p.m.—6:00 p.m. 报到

5:00 p.m.—7:00 p.m. 晚餐

8 月 27 日星期六

上午主持人：刘歆

8:30a.m.—8:50 a.m. 开幕式（戴彧虹、郭田德、文再文）

8:50 a.m.—9:50 a.m. 特邀报告（戴彧虹、郭田德）

9:50 a.m.—10:00 a.m. 集体照拍摄

10:00 a.m.—10:20 a.m. 茶歇

10:20 a.m.—11:40 a.m. 参会者报告（刘耀华、窦明圆、郭科、刘佛祥）

10:20 a.m.—10:40 a.m. 刘耀华

报告题目：应用加权 ADMM 增强分布式网络优化中的通信效率

10:40 a.m.—11:00 a.m. 窦明圆

报告题目：一种惯性邻近的 Peaceman-Rachford 分裂方法

11:00 a.m.—11:20 a.m. 郭科

报告题目: Convergence Analysis of Douglas-Rachford Splitting Method for “Strongly + Semi” Convex Programming

11:20 a.m.—11:40 a.m. 刘佛祥

报告题目：A Proximal Alternating Direction Method for Multi-block Coupled Convex Optimization

11:40 a.m.—1:30 a.m. 午餐

下午主持人：杨俊锋

1:30 p.m.—2:50 p.m. 参会者报告（杨娇娇、杨茜、潘丽丽、刘璐）

1:30 p.m.—1:50 p.m. 杨娇娇

报 告 题 目： Sparse Recovery of Seismic Source via Partial Group Regularization

1:50 p.m.—2:10 p.m. 潘丽丽

报告题目：Optimality Conditions for Sparse Nonlinear Programming

2:10 p.m.—2:30 p.m. 刘璐

报告题目：Alternating Methods for Linear Hyperspectral Unmixing

2:30 p.m.—2:50 p.m. 王洁

报告题目：On Q Tensors

2:50 p.m.—3:20 p.m. 茶歇

3:20 p.m.—4:40 p.m. 参会者报告（姜燕君、王龙飞、韩璐、贾泽慧）

3:20 p.m.—3:40 p.m. 姜燕君

报告题目：An approximation algorithm for soft-capacitated k-facility location problem

3:40 p.m.—4:00 p.m. 王龙飞

报告题目：Globally minimizing the sum of two ratios of quadratic functions based on new saw-tooth curve bounds

4:00 p.m.—4:20 p.m. 韩璐

报告题目：An approximation algorithm for the k-MST problem with linear penalties

4:20 p.m.—4:40 p.m. 贾泽慧

报告题目：Traffic managements for Household Travels in Congested Morning Commute

4:40 p.m.—5:00 p.m. 茶歇

5:00 p.m.—6:00 p.m. 开放式交流

6:00 p.m.—7:00 p.m. 晚餐

8 月 28 日星期日

上午主持人：文再文

9:00a.m.—10:00 a.m. 特邀报告（许志强）

10:00a.m.—10:20 a.m. 茶歇

10:20 a.m.—11:40 a.m. 参会者报告（高斌、赵瑞雪、刘浩洋、徐智韬）

10:20 a.m.—10:40 a.m. 高斌

报告题目：A New First-order Framework for Orthogonal Constrained Optimization Problems

10:40 a.m.—11:00 a.m. 赵瑞雪

报告题目：Global complexity bound of the Levenberg-Marquardt method

11:00 a.m.—11:20 a.m. 刘浩洋

报告题目：Block algorithms with augmented Rayleigh-Ritz projection for large-scale eigenpair computation

11:20 a.m.—11:40 a.m. 徐智韬

报告题目：A New Uzawa type Algorithm for Nonsymmetric Saddle Point Problems

11:40 a.m.—2:00 p.m. 午餐

下午主持人：刘亚锋

2:00 p.m.—3:20 p.m. 参会者报告（户将、杨美佳、陈诚、张婷）

2:00 p.m.—2:20 p.m. 户将

报告题目：Adaptive regularized method for optimization on Riemannian manifold

2:20 p.m.—2:40 p.m. 杨美佳

报告题目：Fast algorithms for globally solving Tikhonov regularized total least squares

2:40 p.m.—3:00 p.m. 陈诚

报 告 题 目： A General Two-Level Subspace Method for Nonlinear Optimization

3:00 p.m.—3:20 p.m.张婷

报告题目：Gabor-scale binary pattern for face recognition

3:20 p.m.—3:40 p.m. 茶歇

3:40 p.m.—5:00 p.m. 参会者报告（韩瑜、刘东梅、王加翠）

3:40 p.m.—4:00 p.m. 韩瑜

报告题目：The connectedness of the solutions set for generalized vector equilibrium problems

4:00 p.m.—4:20 p.m. 刘东梅

报告题目：可探测问题不可行性的无滤子逐步二次规划方法

4:20 p.m.—4:40 p.m. 王加翠

报告题目：The improved multi-populations artificial bee colony algorithm based on heterogeneous comprehensive learning

4:40 p.m.—5:00 p.m. 茶歇

5:00 p.m.—5:10 p.m. 颁奖和闭幕式

5:10 p.m.—6:30 p.m. 晚餐

主讲人信息

研究生报告

First group

1 刘耀华，中国科学技术大学硕士生，指导教师：凌青

论文题目：应用加权 ADMM 增强分布式网络优化中的通信效率

报告摘要：分布式加权 ADMM 用来解决分布式网络中的一致性优化问题。相比传统分布式 ADMM 只能通过调节约束的惩罚参数加快优化收敛速率，且每个网络中的节点都需要与其所有相邻节点进行通信，分布式加权 ADMM 通过给相邻节点之间的连接引入权重，加快收敛速率。同时通过调节权重值，减少节点通信的邻居节点数量，增强分布式网络优化中的通信效率。

2 窦明圆，河北工业大学硕士生，指导教师：刘新为

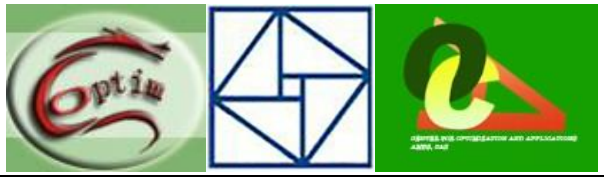
论文题目：一种惯性邻近的 Peaceman-Rachford 分裂方法

报告摘要：严格压缩 Peaceman-Rachford(PR)分裂方法是一种收敛速度快于交替方向乘子法的求解线性约束可分离凸优化问题的有效方法. 而最近提出的半邻近 PR 分裂方法是严格压缩的 PR 分裂方法的一种改进方法. 基于惯性邻近交替方向乘子法的思想, 通过进一步改进半邻近 PR 分裂方法, 提出了一种惯性邻近 PR 分裂方法. 该方法包含了严格压缩的 PR 分裂方法和半邻近 PR 分裂方法作为特殊情况. 此外, 在一定的假设下, 证明了迭代序列的全局收敛性. 最后, 通过数值实验说明了算法的有效性.

3 郭科，南京师范大学博士生，指导教师：韩德仁

论文题目：Convergence Analysis of Douglas-Rachford Splitting Method for “Strongly + Semi” Convex Programming

报告摘要：We consider the convergence of the Douglas-Rachford splitting method (DRSM) for minimizing the sum of a strongly convex function and a semiconvex function; a setting having various applications especially in some sparsity-driven scenarios with the purpose of avoiding biased estimates which usually occur when convex penalties are used. Though convergence of the DRSM has been well studied in the case where both functions are convex, its results for some nonconvex-function-involved cases, including the ``strongly + semi" convex case, are



still in infancy. In this paper, we prove the convergence of the DRSM in the ``strongly + semi" convex setting, under relatively mild assumptions compared with some existing work in the literature. Moreover, we establish the non-ergodic worst-case convergence rate in term of iteration complexity; and locally linear convergence rate in asymptotical sense under some regularity conditions.

4 刘佛祥，南京师范大学硕士生，指导教师：孙越泓徐玲玲韩德仁

论文题目：A Proximal Alternating Direction Method for Multi-block Coupled Convex Optimization

报告摘要：In this paper, we propose a proximal alternating direction method (PADM) for solving the convex optimization problems with linear constraints whose objective function is the sum of multi-block separable functions and coupled quadratic function. The algorithm generates iterates via a simple correction step, where the decent direction is based on the PADM. We prove the convergence of the generated sequence under some mild assumptions. Finally, some familiar numerical results are reported for the new algorithm.

Second group

5 杨娇娇，中国科学技术大学博士生，指导教师：杨周旺

论文题目：Sparse Recovery of Seismic Source via Partial Group Regularization

报告摘要：For the seismic source localization problem, it usually needs to find the sparse solution to an underdetermined system of equations. The single measurement of sparse representation problem has been widely studied, with sparsity generally enforced by imposing penalties based on the l_1-norm. However it may suffer from some bias if we penalize each entry of the variable. Then we consider the recovery model with partial regularizers. This thought is novel and it can work with good performance for our problem. While considering the multiple measurement vector for the recovering seismic source problem we propose the partial group regularizers and give some sufficient conditions for local or global recovery of the sparsest solution. We use alternating direction method to solve this recovery model. It just needs to solve three subproblems and each problem has a closed-form solution. In our implementation we find that this penalty strategy can

make better performance than l_1 regularizers. What's more this algorithm has an advantage in accuracy and robustness.

6 潘丽丽，北京交通大学博士生，指导教师：修乃华

论文题目：Optimality Conditions for Sparse Nonlinear Programming

报告摘要：The sparse nonlinear programming (SNP) is to minimize a general continuously differentiable function subject to sparsity, nonlinear equality and inequality constraints.In this talk, we first define two restricted constraint qualifications and show how these constraint qualifications can be appliedto obtain the decomposition properties of the Fr$\acute{e}$chet, Mordukhovich and Clarke normal cones to the sparsity constrained feasible set.Based on the decomposition properties of the normal cones,we then present and analyze three classes of KKT conditions for the SNP.At last, we establish the second-order necessary optimality condition and sufficient optimality condition for the SNP.

7 刘璐，北京大学硕士生，指导教师：文再文

论文题目：Alternating Methods for Linear HyperspectralUnmixing

报告摘要：In this paper, we proposed several alternating methods for linear hyperspectralunmixing, which can find vertices of the minimum volume simplex containing the observed hyperspectral vectors. The preliminary numerical results showed that our new algorithms outperformed the state-of-the-art algorithms with simulated datasets.

8 王洁，天津大学博士生，指导教师：黄正海

论文题目：On Q Tensors

报告摘要：One of the central problems in the theory of linear complementarity problems (LCPs) is to study the class of Q-matrices which is associated with the solvability of LCP. Recently, the concept of Q-matrix has been extended to the case of tensor, called Q-tensor, which is associated with the solvability of the corresponding tensor complementarity problem - a generalization of LCP; and some basic results related to Q-tensors have been obtained in the literature. In this paper, we consider several famous results related to Q-matrices and investigate whether

they can be extended to the tensor space or not, i.e., we show that within the class of strong P0-tensors or nonnegative tensors, four classes of tensors, i.e., R0-tensors, R-tensors, ER-tensors and Q-tensors, are all equivalent. We also construct several examples to show that three famous results related to Q-matrices cannot be extended to the tensor space; and one of which gives a negative answer to a question raised recently by Song and Qi.

Third group

9 姜燕君，北京工业大学博士生，指导教师：徐大川

论文题目：An approximation algorithm for soft-capacitated k-facility location problem

报告摘要：We present an approximation algorithm for the non-uniform soft-capacitated k-facility location problem, violating the capacitated constrains by no more than a constant factor. The main technique is based on the primal-dual algorithm for the soft-capacitated facility location problem, and the exploitation of the combinatorial structure of the fractional solution for the soft-capacitated k-facility location problem.

10 王龙飞，北京航空航天大学博士生，指导教师：夏勇

论文题目：Globally minimizing the sum of two ratios of quadratic functions based on new saw-tooth curve bounds

报告摘要：We consider the problem of minimizing the sum of two quadratic convex-concave ratios over a convex set (SOR). It can be reformulated as a one-dimensional minimization problem, where the objective function is evaluated by solving convex quadratic optimization. The corresponding optimal Lagrangian multipliers are used to construct Lipschitz-type lower bounds, which play a key role in developing an efficient algorithm for globally solving (SOR). In this paper, we propose a new algorithm to find an ϵ-approximation to the global minimizer of (SOR) based on strictly improved saw-tooth curve bounds. The algorithm is further extended to minimize the sum of two quadratic convex-convex ratios.

11 韩璐，北京工业大学博士生，指导教师：徐大川

论文题目：An approximation algorithm for the k-MST problem with linear penalties

报告摘要：We consider the k-minimum spanning tree problem with linear penalties(k-MSTWP), extending both the k-minimum spanning tree problem(k-MST) and the prize-collecting Steiner tree problem(PCST). We present a 5-approximation algorithm for the problem via the methods of primal-dual and Lagrangian relaxation.

12 贾泽慧，南京师范大学博士生，指导教师：韩德仁

论文题目：Traffic managements for Household Travels in Congested Morning Commute

报告摘要：Due to the high car ownership cost or car ownership restrictions in many major cities, household travels, which include multiple trips for all the household members, become very common. One typical household travel can be observed as the consecutive school trip and work trip, which sends the traveler's children to school first and then drive to their workplaces. In this paper, we analyse the departure time choice of the household travels and the equilibrium trip scheduling, i.e., extending the standard Vickrey's bottleneck model from work commute with one single preferred arrival time (work start time) to household commute with two consecutive preferred arrival times (school start time and work start time). Then, we investigate one step toll in peak hour window to best manage the morning commute of household travels and analyse the impact of the school-work start time difference on individual cost, social cost and traffic managements, so that we can optimally set the school-work start time difference to minimize the total travel cost. In addition, an alternative tradable credit scheme is designed to manage the morning commute as a replacement of the road toll scheme.

Fourth group

13 高斌，中国科学院数学与系统科学研究院博士生，指导教师：袁亚湘

论文题目：A New First-order Framework for Orthogonal Constrained Optimization Problems

报告摘要：The orthogonal constrained optimization is widely used in many areas. Once the objective is nonconvex and specially includes linearterm, the problem can

be very difficult to tackle. In this paper, we propose a first-order framework which consists of two parts and preserves thefeasibility of iterates all the time. In the first part, a sufficient reduction of function value can be achieved by two methods. One is gradient reflectionwith explicit expression realized by gradient descent and Householder transformation. The other is column-wise block coordinate descent. Thesecond part, a symmetrization step is employed to symmetrize the Lagrangian multipliers of orthogonal constraint. Global convergence for thisapproach and linear convergence rate for the special cases are established. Preliminary experiments illustrate that the new algorithm performs welland is of great potential.

14 赵瑞雪，上海交通大学硕士生，指导教师：范金燕

论文题目：Global complexity bound of the Levenberg-Marquardt method

报告摘要：In this paper, we give a new choice of the Levenberg-Marquardt parameter for the Levenberg-Marquardt method for nonlinear equations.We show that the new Levenberg-Marquardt algorithm has global convergence under some suitable conditions.We also prove that the algorithm requires at most e^{-2} iterations to derive the norm of the gradient of the merit function below the desired accuracy e.

15 刘浩洋，北京大学硕士生，指导教师：文再文

论文题目：Block algorithms with augmented Rayleigh-Ritz projectionsfor large-scale eigenpair computation

报告摘要：Most iterative algorithms for eigenpair computation consist of two main steps: a subspace update (SU) step that generates bases for approximate eigenspaces,followed by a Rayleigh-Ritz (RR) projection step that extracts approximateeigenpairs. So far the predominant methodology for the SU step is based onKrylov subspaces that build orthonormal bases piece by piece in asequential manner. In this work, we investigate block methods in the SUstep that allow a higher level of concurrency than what is reachable byKrylov subspace methods. To achieve a competitive speed, we propose anaugmented Rayleigh-Ritz (ARR) procedure. Combining this ARR procedure with a set ofpolynomial accelerators, as well as utilizing a few other techniques suchas continuation and deflation, we

construct a block algorithm designed toreduce the number of RR steps and elevate concurrency in the SU steps.Extensive computational experiments are conducted in Matlab on arepresentative set of test problems to evaluate the performance of twovariants of our algorithm.Numerical results, obtained on a many-core computer withoutexplicit code parallelization, show that when computing a relativelylarge number of eigenpairs, the performance of our algorithms iscompetitive with that of several state-of-the-art eigensolvers.

16 徐智韬，北京大学博士生，指导教师：高立

论文题目：A New Uzawa type Algorithm for Nonsymmetric Saddle Point Problems

报告摘要：Saddle point problems have been attracting people's attention in recent years. To solve large and sparse saddle point problems, Uzawa type algorithms were proposed to avoid solving the linear systems directly. In this report, we propose a new optimization algorithm of Uzawa type to solve nonsymmetric saddle point problems, which often arise from finite element discretization of Navier-Stokes equations. In the report, we will analyse the convergence of the new algorithm and present numerical experiments.

Fifth group

17 户将，北京大学博士生，指导教师：文再文

论文题目：Adaptive regularized method for optimization on Riemannian manifold

报告摘要：Optimization on Riemannian manifold widely arises in eigenvalue computation, density functional theory, Bose-Einstein condensates, image and signal processing. We propose a second-order type approximation to the original problem and apply a first-order type method to solve it. Global convergence to the first-order optimality conditions is established. Preliminary numerical experiments show that our method is promising.

18 杨美佳，北京航空航天大学博士生，指导教师：夏勇

论文题目：Fast algorithms for globally solvingTikhonov regularized total least squares

报告摘要：The Tikhonov regularized total least squares (TRTLS) is a nonconvex

optimization problem. According to Dinkelbach's parametric strategy, it can be equivalently reduced to finding a zero point of a decreasing concave but possibly nonsmooth univariate function. We propose a generalized Newton method (GN) by replacing the derivative with the subgradient. It globally converges to the root. Under a mild assumption, we show that the asymptotic rate of convergence is superlinear. The worst-case time complexity is less than that of the existing bisection method. The disadvantage of (GN) is that at each iteration we have to solve an extended trust region subproblem (ETRS). Then, based on a careful study of the hiddex convexity of (TRTLS), we reduce (TRTLS) to first finding a zero point of a strictly decreasing smooth univariate function and then solving one (ETRS). Numerical results are reported.

19 陈诚，中国科学院数学与系统科学研究院博士生，指导教师：袁亚湘

论文题目：A General Two-Level Subspace Method for Nonlinear Optimization

报告摘要：A new two-level subspace method is proposed for solving the general unconstrained minimization formulations discretized from infinite-dimensional optimization problems. At each iteration, the algorithm executes either a direct step on the current level or a coarse subspace correction step. In the coarse subspace correction step, we augment the traditional coarse grid space by a two-dimensional subspace spanned by the coordinate direction and the gradient direction at the current point. Global convergence is proved and convergence rate is studied under some mild conditions on the discretized functions. Preliminary numerical experiments on a few variational problems show that our two-level subspace method is promising.

20 张婷，天津大学博士生，指导教师：黄正海

论文题目：Gabor-scale binary pattern for face recognition

报告摘要：A novel face descriptor, the Gabor-scale binary pattern (GSBP), is proposed to explore the neighboring relationship in spatial, frequency and orientation domains for the purpose of face recognition. In order to extract the GSBP feature, the Gabor-scale volume and the Gabor-scale vector are introduced by using a group of Gabor wavelet coefficients with a special orientation. Moreover, the

Gabor-scale length pattern and the Gabor-scale ratio pattern are proposed. Compared with the existed methods, GSBP utilizes the deep relations between neighboring Gabor subimages instead of directly combining Gabor wavelet transform and local binary pattern. For estimating the performance of GSBP, we compare the proposed method with the related methods on several popular face databases, including LFW, FERET, AR, Yale and Extended YaleB databases. The experimental results show that the proposed method outperforms several popular face recognition methods.

Sixth group

21 韩瑜，四川大学博士生，指导教师：黄南京

论文题目：The connectedness of the solutions set for generalized vector equilibrium problems

报告摘要：One of the most important problems for vector equilibrium problem is to investigate the properties of the set of solutions. Among many desirable properties of the set of solutions, the connectedness is of considerable interest. The assumptions of monotonicity and compactness play an important role in establishing the connectedness of the sets of various proper efficient solutions to vector equilibrium problems and vector variational inequalities. In this paper, we establish the connectedness of the sets of Henig efficient solutions,globally efficient solutions, weak efficient solutions, superefficient solutionsand efficient solutions for a class of generalized vector equilibrium problemswithout the assumptions of monotonicity and compactness.

22 刘东梅，河北工业大学硕士生，指导教师：刘新为

论文题目：可探测问题不可行性的无滤子逐步二次规划方法

报告摘要：介绍一种新的求解非线性不等式约束的信赖域 SQP 方法. 该方法通过求解基于精确罚函数的 QP 子问题得到搜索方向, 可以探测问题不可行性. 当目标函数值或约束违反度函数值充分下降时接受试探步, 即不选取罚函数方法或滤子方法作为试探步接受准则. 此外, 借鉴无约束优化中非单调技术进一步放宽试探步接收条件. 最后给出了算法全局收敛性证明和简单数值实验.

23 王加翠，南京师范大学说士生，指导教师：孙越泓

论文题目：The improved multi-populations artificial bee colony algorithm based on heterogeneous comprehensive learning

报告摘要：The artificial bee colony (ABC) algorithm is one of popular swarm intelligence algorithms that inspired by the forging behavior of honeybee colonies.To improve the convergence ability,search speed of finding the best solution and control the balance between exploration and exploitation using this approach,we proposed the improved multi-populations artificial bee colony algorithm based on heterogeneous comprehensive learning(HCLIABC).In this algorithm,the swarm population is also divided into two subpopulations.Inspired by particleswarm optimization (PSO),the food source will be update by all dimension rather than on dimension randomly，Meanwhile,comprehensive learning (CL) strategy is used to generate the exemplars for both subpopulation.Inaddition,opposition based learning (OBL) was used to improve the quality of initial swarm,gaussian distributionwas used to balance the exploration and exploitation abilities of exploitation-subpopulation,multiplicative weightupdate method (MWU) was used to update the selected probability of onlookers in each sub-population.To evaluate the performance of the improved multi-populations artificial bee colony algorithm,we implemented numerical optimization problems based on 18 benchmark functions.Computational results demonstrate that HCLIABC can prevent premature convergence and produce competitive solutions.

附一：地图：中国科学院数学与系统科学研究院南楼、基础园区餐厅（用餐）和恒兴大厦（住宿）

附二：路线：

从机场到学校：首都国际机场——机场大巴中关村线，到保福寺桥西下车（约 1.5h）或机场线到三元桥换乘 10 号线（外环）到知春里站，出站（B 口）步行 1km 左右（约 1.5h）

从火车站到学校：北京站——地铁 2 号线到西直门站换乘 13 号线到知春路站，出站（A 口）可乘坐 601 路到达保福寺桥南站（约 1h）

北京南站——4 号线到海淀黄庄站，出站（C 口）可乘坐 109/611/630/634 路到达保福寺桥南站（约 1h）

北京西站——9 号线到国家图书馆站换乘 4 号线到海淀黄庄站，出站（C 口）可乘坐 109/611/630/634 路到达保福寺桥南站（约 50min）